Non-CME Webinar Series
designed with the trainee in mind
first Tuesday of the month

ASRA PAIN MEDICINE
THE ASSOCIATION OF PAIN PROGRAM DIRECTORS
ADVANCING EDUCATION IN MULTIDISCIPLINARY PAIN MEDICINE

Neuromodulation: Indication-Approach-Complications-Outcomes

Tuesday, January 3, 2023

7-8:30 pm ET

Neuromodulation Outcomes

- Tonic Stimulation was usually presented as a 50/50 outcome – 50% of patients would experience 50% relief in their pain symptoms
- Advancements in SCS have improved reported outcomes
- Several novel waveforms have changed the landscape of neuromodulation outcomes – particularly shifting from paresthesia based to subperception modalities

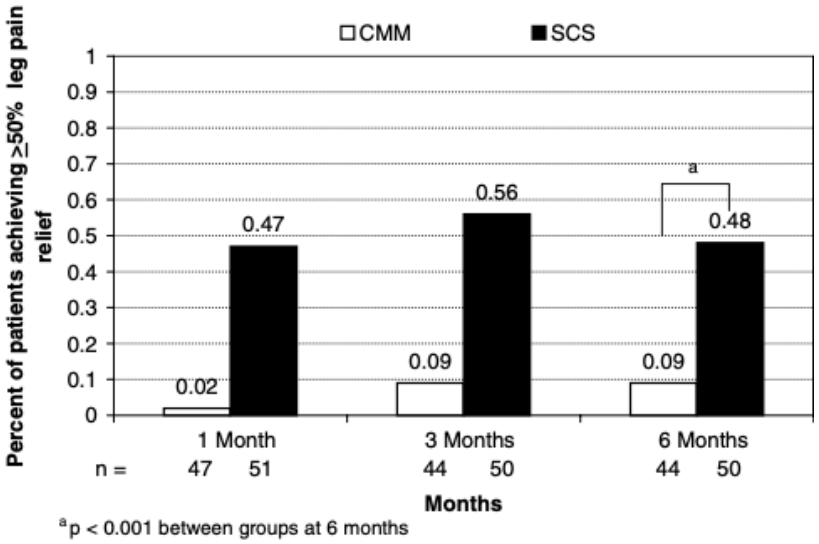
Neuromodulation Outcomes

- Earlier studies establishing the evidence for tonic stimulation

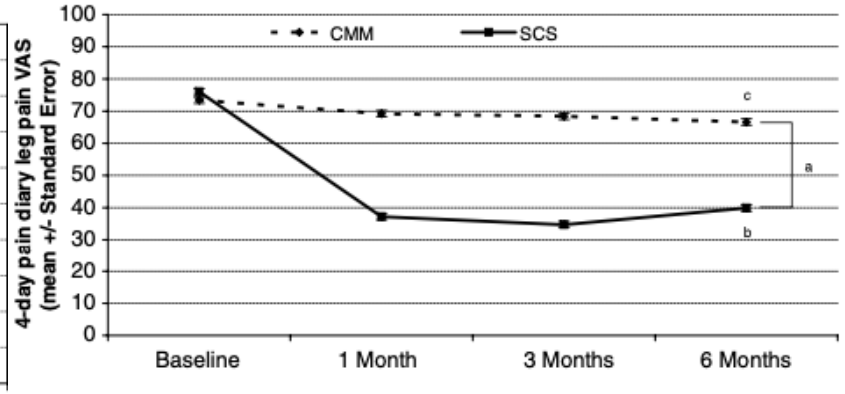
	North 2005	Kumar 2007
Indication	Persistent Spinal Pain Syndrome	Persistent Lumbar Radicular Pain after Surgery
Comparison	SCS (n=24) vs Reoperation (n=26)	SCS + CMM (n=52) vs CMM alone (n=48)
Follow-Up	Avg 2.9 years (1.8-5.7 years)	24 months
Outcomes	"Success" – SCS: 15/29 (52%) Sx: 3/16 (19%)	>50% pain improvement – SCS: 48% CMM: 9%

Neuromodulation Outcomes

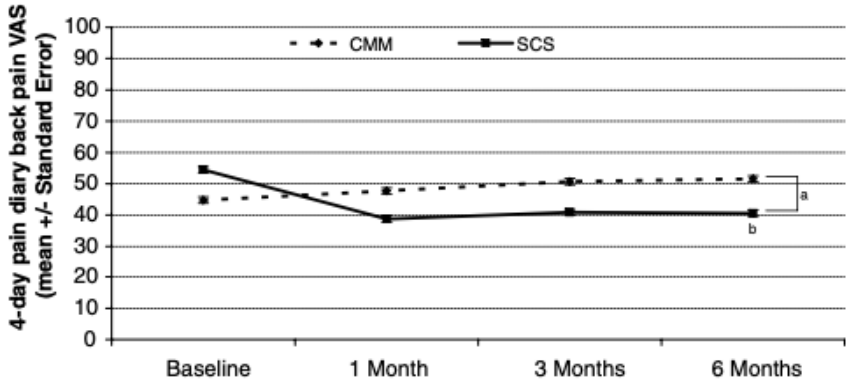
- Earlier studies establishing the evidence for tonic stimulation



[a]p < 0.001 between groups at 6 months



[a]p < 0.001 between groups at 6 months
[b]p < 0.001 in SCS group between 6 months and baseline
[c]p = 0.03 in CMM group between 6 months and baseline



[a]p = 0.008 between groups at 6 months
[b]p = 0.007 in SCS group between 6 months and baseline

Neuromodulation Outcomes

High frequency stimulation

HF SCS	Kapural 2015/2016 (SENZA-RCT)	Stauss et al 2019
Indication	Chronic Intractable Back And Leg Pain	Chronic Trunk and/or Limb Pain
Comparison	HF10 (n=90) vs traditional SCS (n=81)	Retrospective review of HF-SCS patients
Follow-Up	12 and 24 months	Mean 8.9 months
Outcomes	>50% pain improvement – HF10: 78.7% / 76.5% (back) 80.9% / 72.9% (leg) tSCS: 51.3% / 49.3% (back) 50% / 49.3% (leg)	87% with >50% pain relief 32.1% decreased medications 72.3% improved function 68% improved sleep

Neuromodulation Outcomes

High frequency stimulation

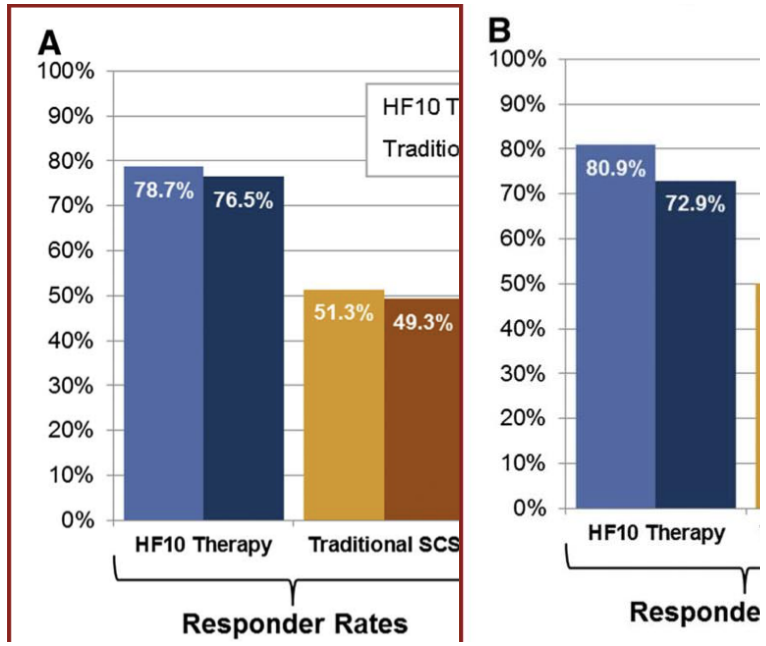
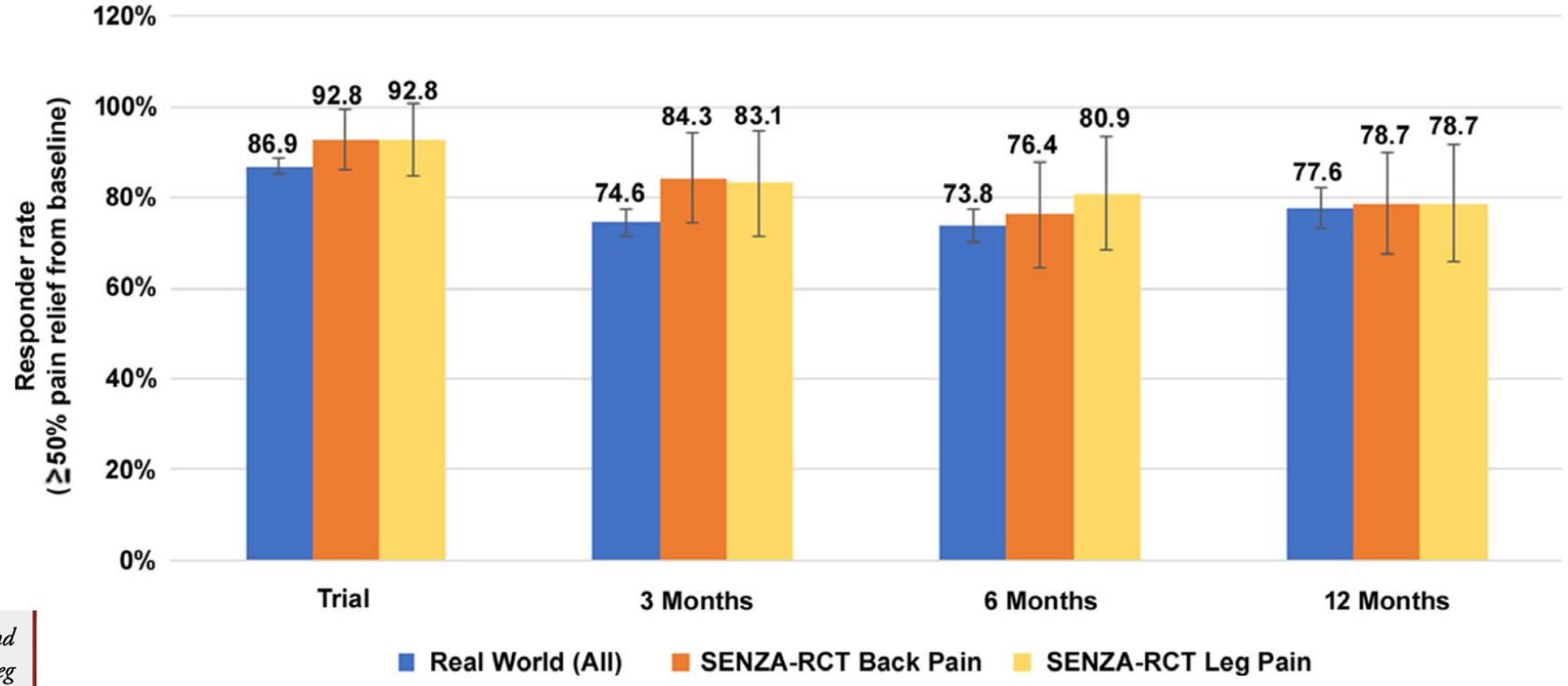


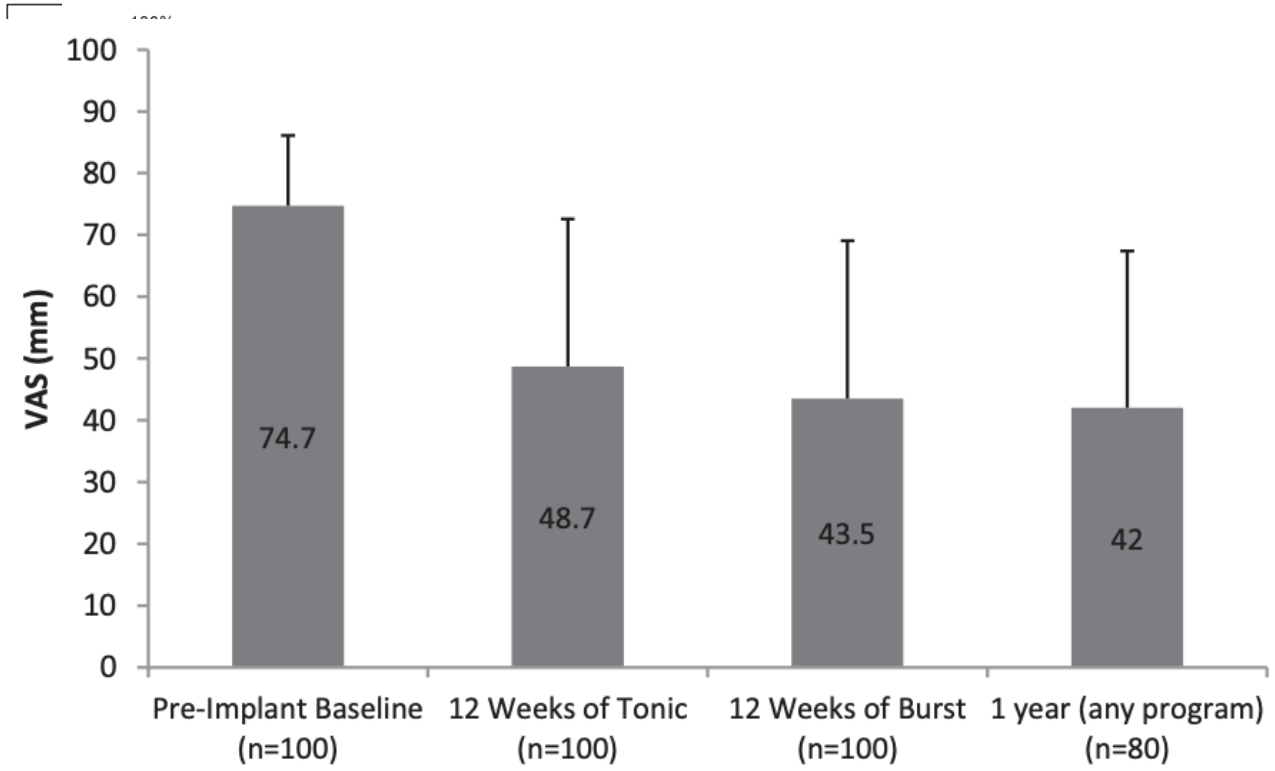
FIGURE 2. *Responder (≥50% decrease in pain score from baseline) and remitter (pain score of ≤2.5) rates at 24 months for (A) back pain and (B) leg pain. HF10 therapy, 10-kHz high-frequency therapy; SCS, spinal cord stimulation.*



Kapural L, Yu C, Doust MW, Gliner BE, Vallejo R, Sitzman BT, Amirdelfan K, Morgan DM, Yearwood TL, Bundschu R, Yang T, Benyamin R, Burgher AH. Comparison of 10-kHz High-Frequency and Traditional Low-Frequency Cord Stimulation for the Treatment of Chronic Back and Leg Pain: 24-Month Results From a Multicenter, Randomized, Controlled Pivotal Trial. Neurosurgery. 2016 Nov;79(5):667-677. doi: 10.1227/NEU.0000000000001414 PMID: 27584814; PMCID: PMC5058646.

Neuromodulation Outcomes

Burst Stimulation



Burst SCS	Deer et al 2018 (SUNBURST RCT)
Indication	Chronic Intractable Trunk and/or Limb Pain
Comparison	Tonic vs Burst stimulation with crossover design
Follow-Up	6, 12, 18, 24 weeks, up to 24 months
Outcomes	60/100 (60%) responded to burst 51/100 (51%) responded to tonic At 1 year: 60/88 (68.2%) patients preferred burst 21/88 (23.9%) patients preferred tonic

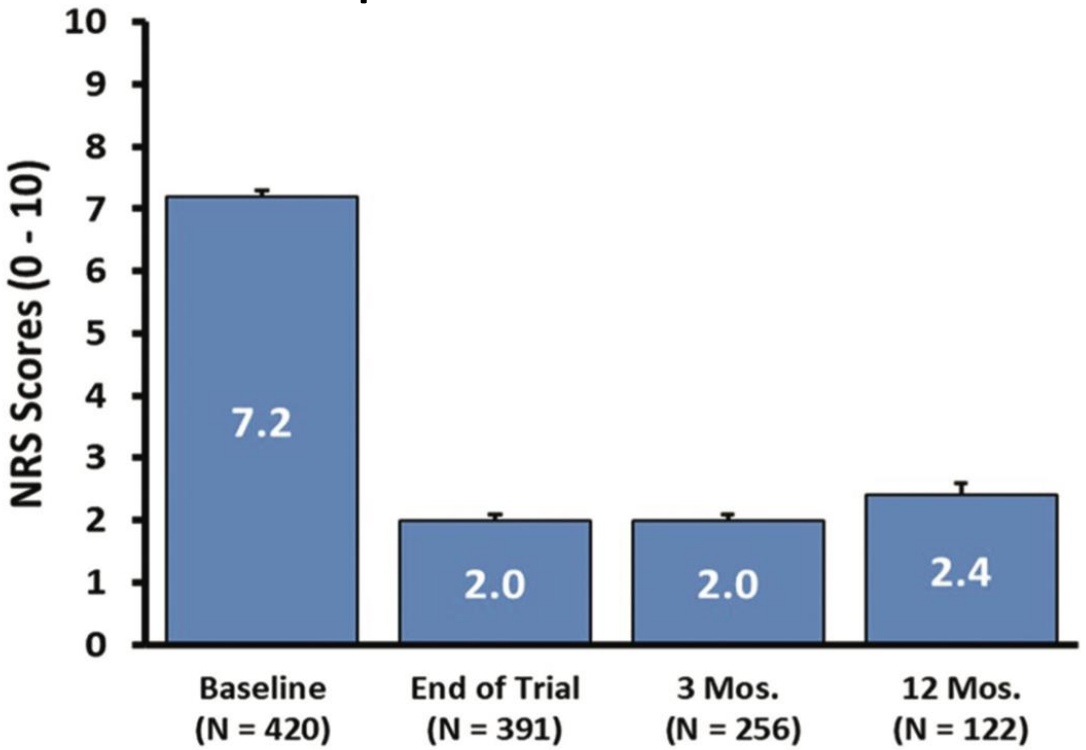
Neuromodulation Outcomes

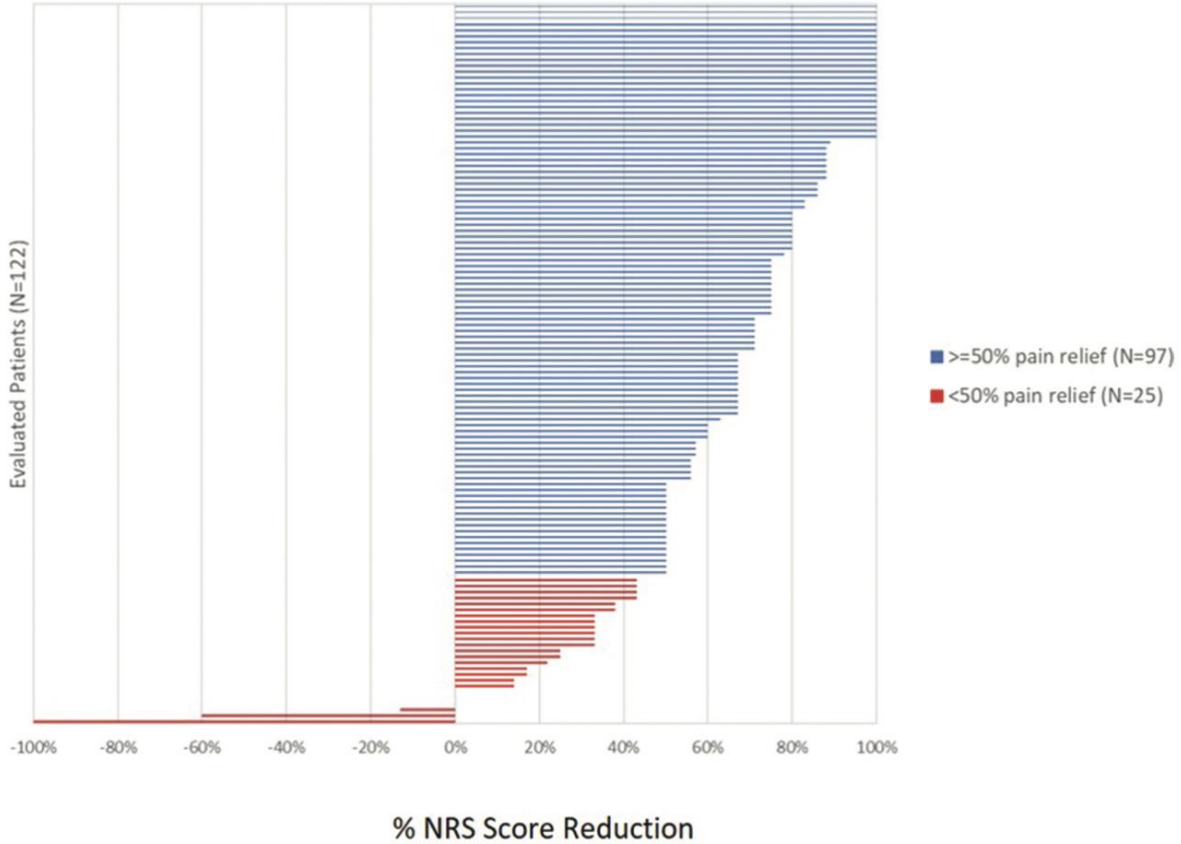
SubPerception Stimulation

SP-SCS	Thomson et al 2018 (PROCO RCT)	North et al 2020 (WHISPER RCT)
Indication	Low back +/- leg pain	Pts w/ SCS for chronic trunk/limb pain
Comparison	1 kHz vs 4 kHz vs 7kHz vs 10kHz	SubPerception (<1.2kHz) vs SupraPerception
Follow-Up	24 months	12 months
Outcomes	~50% back, leg, and overall pain relief across all frequencies	> 50% pain relief SubP: 39% (27/70) SupraP: 29% (20/70) 66% (93/140) preferred SubP SubP: mean VRS 4 at 12mo from 7.3 baseline (n=80)

Neuromodulation Outcomes

SubPerception Stimulation



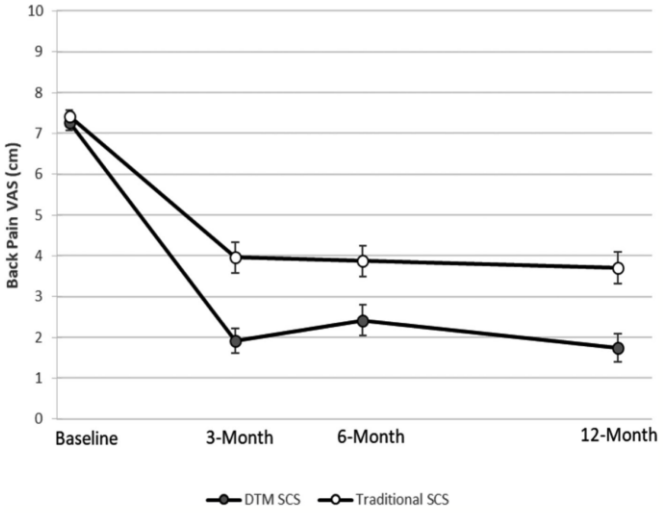


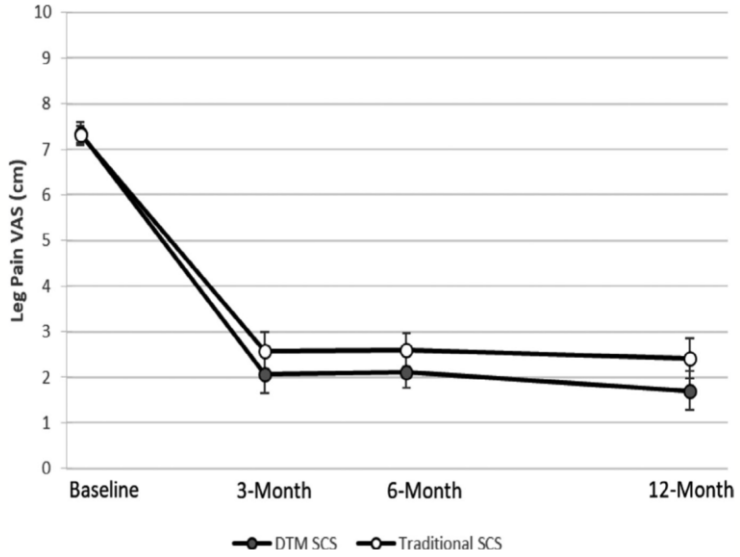
Real-world, multicenter, consecutive, retrospective, observational case series utilizing multiple SCS modalities

Clark S. Metzger, M. Blake Hammond, Stephen T. Pyles, Edward P. Washabaugh III, Romanth Waghmarae, Anthony P. Berg, James M. North, Yu Pei & Roshini Jain (2020) Pain relief outcomes using an SCS device capable of delivering combination therapy with advanced waveforms and field shapes, Expert Review of Medical Devices, 17:9, 951-957, DOI: 10.1080/17434440.2020.1812383

Neuromodulation Outcomes

Differential Target Multiplexed (DTM) Stimulation





DTM-SCS	Fishman et al 2021
Indication	Chronic low back and leg pain
Comparison	DTM (n=42) vs traditional SCS (n=37)
Follow-Up	Up to 12 months
Outcomes	>80% relief of LBP DTM: 69% vs tSCS: 35%

Neuromodulation Outcomes

Other applications with strong outcomes:

- Dorsal Root Ganglion Stimulation
- SCS and DRG-S for CRPS
- Non-surgical back pain
- Pelvic pain
- Cancer pain
- Ischemic lower extremity pain